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Please file the following enclosed patent application papers:
Applicant #1, Name: Michael Aycock
Applicant #2, Name:
Title: Tubular Cross-Member Supporter for Furniture
Specification, Claims, and Abstract: Nr. Of Sheets
☑ Declaration: Date Signed: 02/22/98
☐ Drawing(s): Nr. Of Sheets Enc.: (In Triplicate): Formal: 8 Informal:8
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Title

Cross-Member Supporter for Foldable Furniture

Field of the Present Invention

The present invention relates to foldable furniture, and more particularly to a cross-member supporter for foldable furniture, which enables at least two construction members to selectively be supported in strongly extended cross structure or be folded in parallel compact structure for easy storage and carrying purposes.

Background of the Present Invention

Cross-member construction is the most popular structure in foldable furniture. As shown in Fig. 1, a conventional cross-member construction is illustrated as a simple foldable stool or footstand. It comprises a first U-shape member 11 having two parallel stems 111, 112 respectively connected with two parallel stems 121, 122 of a second U-shape member 12 by means of cross-member construction, wherein a middle position of each of the stems 111, 112, 121, 122 provides a hole so that a connecting means 13, such as rivet or bolt and nut, is able to pivotally connect two corresponding stems 111 & 121 or 112 & 122 in such middle position by penetrating through the holes thereon. Accordingly, the two connecting stems 111 & 121 or 112 & 122 form a cross-member construction.

Such conventional cross-member construction enables the two stems 111 & 121 or 112 & 122 to selectively stretch apart from each other to form a X-shaped structure as shown in Fig.1 or fold towards each other along the arrows shown in Fig. 1. It is well known that the conventional connecting means 13 can only pivotally connect two stems together but fails to provide any supporting to the two stems. In order to support the two

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U-shape members 11, 12 in position to form the X-shaped structure, at least a foldable supporting frame 14 must be mounted between the two stems. However, such supporting frame 14 can only limit the stretching distance between the two stems 111, 121. The weight of the sitter is almost fully supported by the rivets 13 connecting the stems and the supporting frame. In other words, such conventional cross-member construction fails to support heavy loading. Oppositely, the connecting means 13 of the conventional cross-member construction is easier to be damaged because it bears most of the loading stress.

Moreover, the user must also manually help to fold up the supporting frame 14 before folding up the foldable furniture. Sometimes, if the user fails to ensure the supporting fame 14 being fully stretched out, the cross-member construction will become very weak and may cause danger to the sitter. Besides, the manufacturer has to process excess step to install the supporting frame 14 that may unreasonably increase the manufacturing cost.

Summary of the Present Invention

It is thus a first object of the present invention to provide a cross-member supporter for foldable furniture, which enables at least two construction members to selectively be supported in strongly extended cross structure or be folded in parallel compact structure for easy storage and carrying purposes.

A further object of the present invention is to provide a cross-member supporter for foldable furniture, which not only can enables the construction members to stretch apart from each other to form a predetermined cross construction, but also can enforce the supporting strength of the cross construction without the need of any additional supporting component.

Yet another object of the present invention is to provide a cross-member supporter for installing to a foldable furniture, which enables the user to extend and fold the foldable furniture easily. Moreover, the downward loading applied to the foldable furniture is capable of ensuring the cross construction to fully stretch and rigidly stand in position.

Still another object of the present invention is to provide a cross-member supporter for foldable furniture, wherein a single cross-member supporter is sufficient to construct a tri-pod stool that can support more loading, so that it can substantially reduce the construction cost.

Still another object of the present invention is to provide a cross-member supporter for foldable furniture, which can reduce the manufacturing steps, construction parts and cost of the foldable furniture.

Accordingly, in order to accomplish the above objects, the present invention provides a cross-member supporter adapted to connect at least two elongated stems of a foldable furniture. The cross-member supporter comprises a supporter body having a predetermined thickness. The supporting body has at least two vertical connecting holes and two inclined supporting holes provided therethrough. The two inclined supporting holes are respectively extended from top to bottom through the two vertical connecting holes to form two supporting through slots. An axis of the vertical connecting hole of each of the supporting through slots is intersected with an axis of the respective inclined supporting hole, wherein each of the supporting through slots defines an upper supporting groove and a lower supporting groove which are inclined in opposite direction. The two elongated stems are penetrated through and pivotally connected at the two supporting through slots respectively. Thereby, each of the elongated stems can be inclinedly rested and supported by an upper groove surface and a lower groove surface of the respective inclined supporting hole so as to form a cross construction.

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Brief Description of the Drawings

Fig. 1 is a perspective view of a conventional stool.

Fig. 2 is a sectional view of a cross-member supporter for foldable furniture according to a first preferred embodiment of the present invention, illustrating a stem inclinedly supported thereto.

Fig. 3A is a perspective top view of the cross-member supporter for foldable furniture according to the above first preferred embodiment of the present invention, wherein two inclined stems are illustrated by hypothetical lines to show a cross construction.

Fig. 3B is a perspective bottom view of the cross-member supporter for foldable furniture according to the above first preferred embodiment of the present invention, wherein two stems illustrated by phantom lines are positioned parallelly and vertically.

Fig. 4 is a front view of a foldable furniture equipped with the cross-member supporter according to the above first preferred embodiment of the present invention.

Fig. 5 is a perspective view of a cross-member supporter for foldable furniture according to a second preferred embodiment of the present invention.

Fig. 6 is a sectional view of the cross-member supporter for foldable furniture according to the above second preferred embodiment of the present invention, illustrating a stem inclinedly supported thereto.

Fig. 7 is a perspective view of a tri-pod stool constructed by the cross-member supporter according to the above second embodiment of the present invention.

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Detailed Description of the Preferred Embodiment

Referring to Figs. 1 to 4, a cross-member supporter 20 for foldable furniture according to a first preferred embodiment of the present invention is illustrated. The cross-member supporter 20 is adapted to pivotally connect two elongated stems 51, 52 of a foldable furniture.

The cross-member supporter 20 comprises a supporter body 21 which is a rectangular solid body made of metal of plastic having a predetermined thickness. The supporting body 21 has two supporting through slots 22, 23 parallelly provided thereon. Each of the two supporting through slots 22, 23 is composed of a vertical connecting hole 221, 231 and an inclined supporting hole 222, 232.

The two vertical connecting holes 221, 231 are perpendicular to the supporter body 21. The two vertical connecting holes 221, 231 are vertically extended through the supporter body 21 and the two inclined supporting holes 222, 232 are inclinedly extended through the supporter body 21, wherein the two inclined supporting holes 222, 232 are inclined in opposite direction. One of the inclined supporting holes 222 is extended from upper left to lower right while another inclined supporting hole 232 is extended from upper right to lower left, as shown in Figs. 3A and 3B. Preferably, the diameter of the two vertical connecting holes 221, 231 are equal to the diameter of the two inclined supporting holes 222, 232.

Moreover, the two inclined supporting holes 222, 232 are respectively extended from top to bottom through the two vertical connecting holes 221, 231 to define the two supporting through slots 22, 23, so that an axis of the vertical connecting hole 221, 231 of each of the supporting through slots 22, 23 is intersected with an axis of the respective inclined supporting hole 222, 232. Accordingly, each of the supporting through slots 22, 23 defines an upper supporting groove 223, 233 and a lower supporting groove 224, 234 which are inclined in opposite direction.

The two elongated stems 51, 52 are penetrated through the two supporting through slots 22, 23 respectively. The cross-member supporter 20 further comprises a connecting means 24 for pivotally connecting the two stems 51, 52 at the two supporting through slots 22, 23 respectively. Thereby, each of the elongated stems 51, 52 can be

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inclinedly rested and supported by the upper groove surface 223, 233 and the lower groove surface 224, 234 of the respective inclined supporting hole 222, 232 so as to form a cross construction, as shown in Fig. 3A. As shown in Fig. 3B, the two elongated stems 51, 52 can also be rotated to vertical position in order to fold up the cross construction.

As shown in Fig. 4, an embodying example of the cross-member supporter 20 is illustrated, wherein the cross-member supporter 20 is utilized to pivotally connect two leg stems 51', 52' of a foldable chair 50'. When the two leg stems 51', 52' are inclinedly positioned, a X-shaped cross construction is formed. When the two leg stems 51', 52' are vertically positioned, the chair 50' can be folded up.

Referring to Fig. 2, according to the present invention, the inclinedly positioned stem 51, 52 is strongly supported by the respective supporting through slot 22, 23. When a downward loading force A1 is applied to the stem 51, 52, a portion of the lower surface of the stem 51, 52 is rested and supported by the upper supporting groove 223, 233 and a portion of the upper surface of the stem 51, 52 is rested by the lower supporting groove 224, 234. Therefore, the reaction force A2 is well supported by the lower supporting groove 224, 234. Moreover, since the two stems 51, 52 are inclined in opposite direction, the loading force can be evenly supported and balanced by the supporter body 21. The greater the loading force will ensure a more firmly construction.

Due to the fact that the loading force A1 is supported by the supporter body 21, the presence of the connecting means 24 is merely for pivotally connecting the two stems 51, 52 with the supporter body 21. Nearly no stress will be applied to the connecting means 24. Therefore, a simple connecting means 24 such as a bolt and nut structure, a rivet or a screw is applicable to the present invention. As shown in Figs. 3A and 3B, the connecting means 24 comprises a bolt 241 and a nut 242. A transverse through hole 25 penetrating through the walls of the two supporting through slots 22, 23 is provided on the supporter body 21, so that the bolt 241 can be inserted through the transverse through hole 25 at one side and locked in position by the nut 242 at another side.

Referring to Figs. 5 to 7, a cross-member supporter 40 for foldable furniture according to a second embodiment of the present invention is illustrated. The cross-member supporter 20 is adapted to pivotally connect three elongated stems 61, 62, 63 to form a tri-pod stool 60 as shown in Fig. 7.

Similar to the above first embodiment, the cross-member supporter 40 also comprises a supporter body 41 which is a circular solid body made of metal of plastic having a predetermined thickness. The supporting body 41 has three supporting through slots 42, 43, 44 circularly positioned thereon. Each of the three supporting through slots 42, 43, 44 is composed of a vertical connecting hole 421, 431, 441 and an inclined supporting hole 422, 432, 442.

The three vertical connecting holes 421, 431, 441 are perpendicular to the supporter body 41. The three vertical connecting holes 421, 431, 441 are vertically extended through the supporter body 41 and the three inclined supporting holes 422, 432, 442 are inclinedly extended through the supporter body 41, wherein the three inclined supporting holes 422, 432, 442 are inclined in different predetermined direction. Preferably, the diameter of the three vertical connecting holes 421, 431, 441 are equal to the diameter of the three inclined supporting holes 422, 432, 442.

Moreover, the three inclined supporting holes 422, 432, 442 are respectively extended from top to bottom through the three vertical connecting holes 421, 431, 441 to define the three supporting through slots 42, 43, 44, so that an axis of the vertical connecting hole 421, 431, 441 of each of the supporting through slots 42, 43, 44 is intersected with an axis of the respective inclined supporting hole 422, 432, 442. Accordingly, each of the supporting through slots 42, 43, 44 defines an upper supporting groove 423, 433, 443 on top of the supporter body 41 and a lower supporting groove 424, 434, 444 on bottom of the supporter body 41, which are inclined in opposite direction.

The three elongated stems 61, 62, 63 are penetrated through the three supporting through slots 42, 43, 44 respectively. The cross-member supporter 40 further comprises a connecting means 44 for pivotally connecting the three stems 61, 62, 63 at the three supporting through slots 42, 43, 44 respectively. Thereby, each of the elongated stems 61, 62, 63 can be inclinedly rested and supported by the upper groove surface 423, 433, 443 and the lower groove surface 424, 434, 444 of the respective inclined supporting hole 422, 432, 442 so as to form a cross construction, as shown in Fig. 7. As shown in Fig. 5, the three elongated stems 61, 62, 63 can also be rotated to vertical position in order to fold up the cross construction.

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Referring to Fig. 6, according to the second embodiment of the present invention, the inclinedly positioned stem 61 (62, 63) is strongly supported by the respective supporting through slot 422 (423, 443). When a downward loading force B1 is applied to the stem 61 (62, 63), a portion of the lower surface of the stem 61 (62, 63) is rested and supported by the upper supporting groove 423 (433, 443) and a portion of the upper surface of the stem 61 (62, 63) is rested by the lower supporting groove 424 (434, 444). Therefore, the reaction force B2 is well supported by the lower supporting groove 424 (434, 444). Moreover, since the three stems 61, 62, 63 are inclined in different directions, the loading force B1 can be evenly supported and balanced by the supporter body 41. The greater the loading force will ensure a more firmly construction.

As shown in Fig. 7, an embodying example of the cross-member supporter 40 is illustrated, wherein the cross-member supporter 40 is utilized to pivotally connect the three stems 61, 62, 63' of the tri-pod stool 60. When the three stems 61, 62, 63 are inclinedly positioned, a tri-pod shaped cross construction is formed. When the three stems 61, 62, 63 are vertically positioned, the tri-pod stool 60 is folded up.

It is worth to mention again, since the loading force B1 is supported by the supporter body 41, the presence of the connecting means 44 is merely for pivotally connecting the three stems 61, 62, 63 with the supporter body 41. Nearly no stress will be applied to the connecting means 44. Therefore, a simple connecting means 44 such as a bolt and nut structure, a rivet or a screw is applicable to the present invention. As shown in Figs. 5, the connecting means 44 comprises three screws 441. Three transverse through holes 45 respectively penetrating through the walls of the three supporting through slots 42, 43, 44 are provided on the supporter body 41, so that the three screws 441 can be inserted through the three transverse through holes 45 respectively.

In view of the above disclosure, the present invention can substantially achieve the following advantages:

1. The cross-member supporter for foldable furniture enables at least two construction members to selectively be supported in strongly extended cross structure or be folded in parallel compact structure for easy storage and carrying purposes.

- 2. The cross-member supporter for foldable furniture not only can enables the construction members to stretch apart from each other to form a predetermined cross construction, but also can enforce the supporting strength of the cross construction without the need of any additional supporting component.
- The cross-member supporter for installing to a foldable furniture enables the user to extend and fold the foldable furniture easily. Moreover, the downward loading applied to the foldable furniture is capable of ensuring the cross construction to fully stretch and rigidly stand in position.
- 4. A single cross-member supporter is sufficient to construct a tri-pod stool that can support more loading, so that it can substantially reduce the construction cost.
 - 5. The cross-member supporter for foldable furniture can reduce the manufacturing steps, construction parts and cost of the foldable furniture.

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What is Claimed is:

- l. A cross-member supporter adapted to pivotally connect at least two elongated stems of a foldable furniture, comprising a supporter body having a predetermined thickness, said supporting body having at least two vertical connecting holes and two inclined supporting holes provided therethrough, each of said inclined supporting holes being inclined in different direction, said two inclined supporting holes being respectively extended from top to bottom through said two vertical connecting holes to form two supporting through slots, wherein an axis of said vertical connecting hole of each of said supporting through slots is intersected with an axis of said respective inclined supporting hole, wherein each of said supporting through slots defines an upper supporting groove and a lower supporting groove which are inclined in opposite direction, moreover said two elongated stems are penetrated through and pivotally connected at said two supporting through slots respectively, thereby, each of said elongated stems is able to inclinedly rest and be supported by an upper groove surface and a lower groove surface of said respective inclined supporting hole so as to form a cross construction.
- 2. A cross-member supporter, as recited in claim 1, wherein said two supporting through slots are parallelly provided on said supporter body and said two inclined supporting holes are inclined in opposite direction.
- 3. A cross-member supporter, as recited in claim 1, wherein said two vertical connecting holes are perpendicular to said supporter body.
 - 4. A cross-member supporter, as recited in claim 2, wherein said two vertical connecting holes are perpendicular to said supporter body.
- 5. A cross-member supporter, as recited in claim 1, wherein a diameter of each of said vertical connecting holes is equal to a diameter of each of said inclined
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- 6. A cross-member supporter, as recited in claim 2, wherein a diameter of each of said vertical connecting holes is equal to a diameter of each of said inclined supporting holes.
- 7. A cross-member supporter, as recited in claim 3, wherein a diameter of each of said vertical connecting holes is equal to a diameter of each of said inclined supporting holes.
 - 8. A cross-member supporter, as recited in claim 4, wherein a diameter of each of said vertical connecting holes is equal to a diameter of each of said inclined supporting holes.
 - 9. A cross-member supporter, as recited in claim 1, further comprising a connecting means for pivotally connecting said stems at said supporting through slots respectively.
 - 10. A cross-member supporter, as recited in claim 9, wherein said connecting means comprises a bolt and a nut, a transverse through hole penetrating through walls of said supporting through slots being provided on said supporter body, wherein said bolt is inserted through said transverse through hole at one side of said supporter body and locked in position by said nut at another side of said supporter body.
 - 11. A cross-member supporter, as recited in claim 8, further comprising a connecting means for pivotally connecting said stems at said supporting through slots respectively.
 - 12. A cross-member supporter, as recited in claim 11, wherein said connecting means comprises a bolt and a nut, a transverse through hole penetrating through walls of said supporting through slots being provided on said supporter body, wherein said bolt is inserted through said transverse through hole at one side of said supporter body and locked in position by said nut at another side of said supporter body.
 - 13. A cross-member supporter, as recited in claim 1, wherein said supporter body has totally three supporting through slots circularly aligned thereon for pivotally connecting with three stems to form a tri-pod shaped cross construction.

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- 14. A cross-member supporter, as recited in claim 13, further comprising a connecting means for pivotally connecting said three stems at said three supporting through slots.
- 15. A cross-member supporter, as recited in claim 14, wherein said connecting means comprises three screws, moreover three transverse through holes respectively penetrating through walls of said three supporting through slots are provided on said supporter body, wherein said three screws are inserted and secured through said three transverse through holes respectively.
- 16. A cross-member supporter, as recited in claim 4, wherein said supporter body has totally three supporting through slots circularly aligned thereon for pivotally connecting with three stems to form a tri-pod shaped cross construction.
 - 17. A cross-member supporter, as recited in claim 16, further comprising a connecting means for pivotally connecting said three stems at said three supporting through slots.
 - 18. A cross-member supporter, as recited in claim 17, wherein said connecting means comprises three screws, moreover three transverse through holes respectively penetrating through walls of said three supporting through slots are provided on said supporter body, wherein said three screws are inserted and secured through said three transverse through holes respectively.
- 20 19. A cross-member supporter, as recited in claim 8, wherein said supporter body has totally three supporting through slots circularly aligned thereon for pivotally connecting with three stems to form a tri-pod shaped cross construction, said cross-member supporter further comprising a connecting means for pivotally connecting said three stems at said three supporting through slots.
- 20. A cross-member supporter, as recited in claim 19, wherein said connecting means comprises three screws, moreover three transverse through holes respectively penetrating through walls of said three supporting through slots are provided on said supporter body, wherein said three screws are inserted and secured through said three transverse through holes respectively.

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Corss-Member Supporter for Foldable Furniture

Abstract of the Disclosure

A cross-member supporter for foldable furniture enables at least two construction members to selectively be supported in strongly extended cross structure or be folded in parallel compact structure for easy storage and carrying purposes. The cross-member supporter includes a supporter body having at least two vertical connecting holes and two inclined supporting holes provided therethrough. The two inclined supporting holes are respectively extended from top to bottom through the two vertical connecting holes to form two supporting through slots. An axis of the vertical connecting hole of each of the supporting through slots is intersected with an axis of the respective inclined supporting hole, wherein each of the supporting through slots defines an upper supporting groove and a lower supporting groove which are inclined in opposite direction. The two elongated stems are penetrated through and pivotally connected at the two supporting through slots respectively. Thereby, each of the elongated stems can be inclinedly rested and supported by an upper groove surface and a lower groove surface of the respective inclined supporting hole so as to form a cross construction.

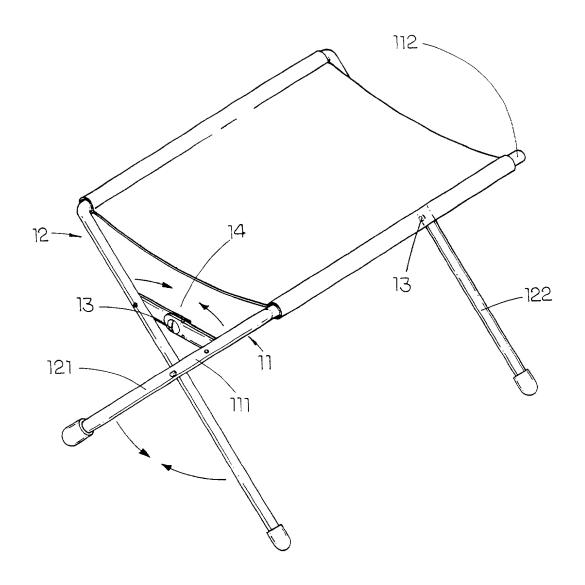
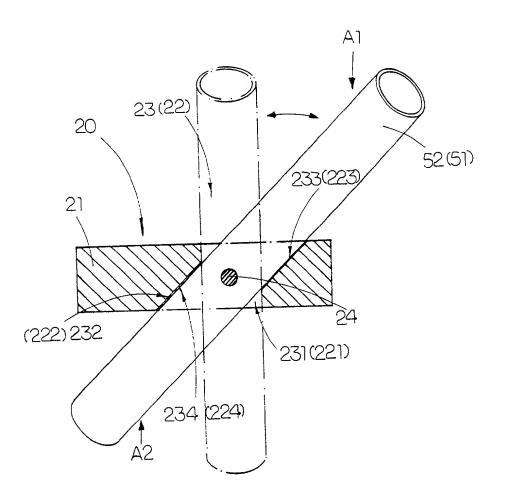
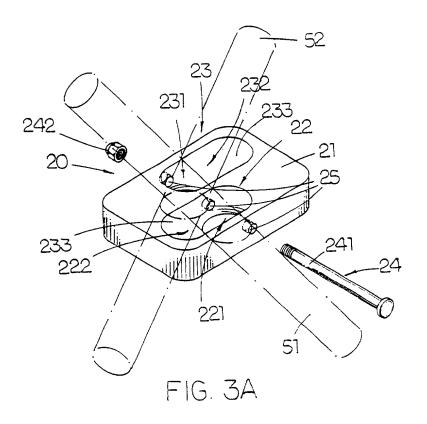


FIG. 1 PRIOR ART



F1G. 2



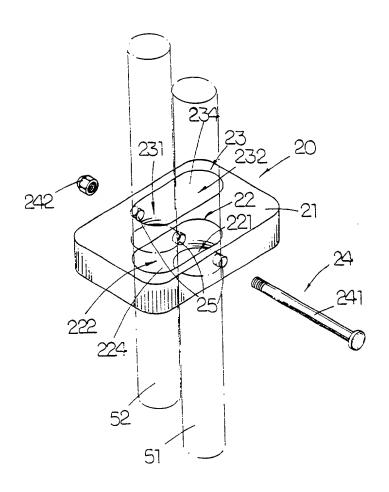


FIG. 3B

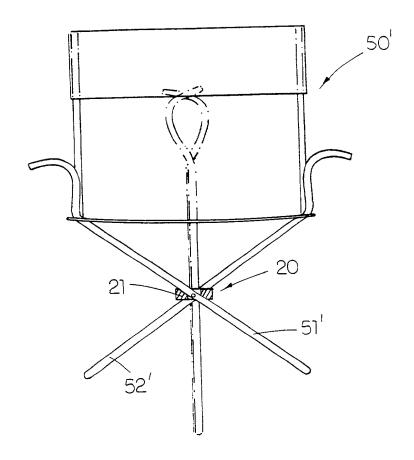


FIG. 4

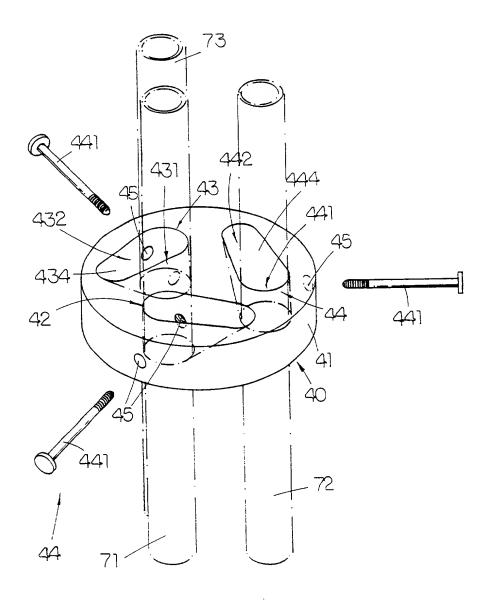


FIG. 5

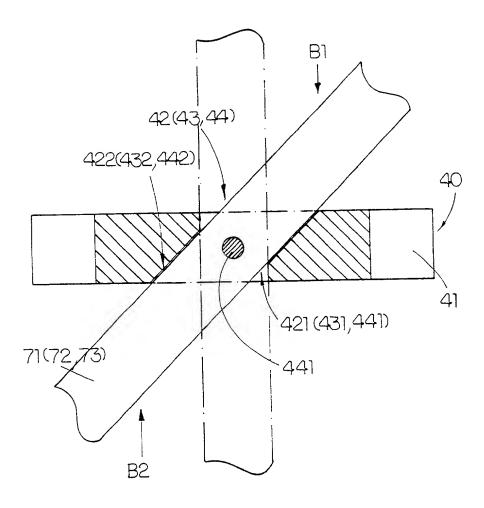


FIG. 6

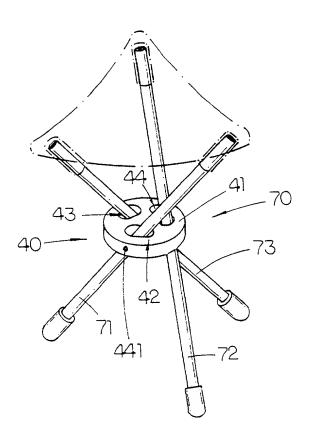


FIG. 7

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

As a below hamed livelior, I lie	leby declare diac.		
My residence, post office addres	s and citizenship are as stated	d below next to my name.	
I believe I am the original, firs inventor (if plural names are list the invention entitled Tubular Cross-Member Sup the specification of which is attacking was filed on Number	ed below) of the subject ma porter for Furniture ched hereto unless the follow	tter which is claimed and for warring box is checked: es Application Number or PCT I	which a patent is sought on
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I hereby state that I have review claims, as amended by any amen I acknowledge the duty to disclor I hereby claim foreign priority certificate listed below and have a filing date before that of the ap	dment referred to above, se information which is mate benefits under 35 USC 11 also identified below any for	rial to patentability as defined in 9 of any foreign application(s reign application for patent or in	n 37 CFR 1.56.) for patent or inventor's
Prior Foreign Application(s)			Priority Claimed Yes No
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I hereby appoint the following at this application and to transact all Raymond Yat Chiu C Address all correspond. Telephone Calls to: (62 I hereby declare that all Statem information and belief are believ willful false statements and the l Title 18 of the United States Cod or any patent issued thereon.	business in the Patent and Than, Reg. No. 37,484 ence to: 516 San Luis Rey Ref. 571-9812 ents made herein of my owned to be true; and further thike so made are punishable	rademark Office connected ther toad, Arcadia, CA 91007 on knowledge are true and that these statements were made by fine or imprisonment, or bo	at all statements made on with the knowledge that th, under Section 1001 of
Full name of sole or first inventor	(given name, family name)	: Michael Aycock	
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I hereby declare that the defined in 13 CFR 121.3-1 section 41(a) and (b) of tincluding those of its af number of employees is ton a full-time, part-time concerns are affiliates of power of control the other I hereby declare that rig business concern identifies _Tubular Cross-Me	18, and reproduced in 3' title 35, United States (filiates, does not excee he average over the pre or temporary basis dureach other when either, or a third party or part hts under contract or l	7 CFR 1.9 (d), for Code, in that the d 500 persons. F vious fiscal year or ring each of the parties controls or hallow have been counted the invention entite.	purposes of paying number of emplo or purposes of the of the concern of the pay periods of the rectly, one concern is the power to content onveyed to and res	g reduced fees und yees of the conce is statement, (1) the he persons employ fiscal year, and a controls or has the crol both.
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concern or organization I held by any person, other CFR 1.9(d) or by any conc nonprofit organization un *NOTE: Separate organization having righ	than the inventor, who ern which would not quader 37 CFR 1.9(e). verified statements	o could not qualify alify as a small bu are required fro	y as a small busing usiness concern und m each named	ess concern under der 37 CFR 1.9(d) o person, concern
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I acknowledge the duty to in loss of entitlement to issue fee or any mainter appropriate. (37 CFR 1.28	o file, in this application small entity status prior nance fee due after the	n or patent, notific r to paying, or at	the time of payin	g, the earliest of
I hereby declare that all made on information and the knowledge that willfu or both, under section 10 may jeopardize the valid verified statements is dire	statements made herein belief are believed to b il false statements and t 01 of Title 18 of the Unity of the application, a	e true; and furthe he like so made a nited States Code.	r that these statem re punishable by fi , and that such wi	ents were made wine or imprisonme Ilful false stateme
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